

# The Schools of Public Health and Practice An Environmental Health Partnership: *Bringing Students to the Science*

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## Introduction

Historically, protection of the health of the public from environmental hazards has been the main impetus for establishing the field of public health.<sup>1</sup> Today, environmental health services account for approximately one-half of the expenditures and personnel practicing public health.<sup>2</sup> However, over the past twenty to thirty years, environmental health functions have been separated from many state and local public health agencies. The result has been "...[diffuse] patterns of responsibility, lack of coordination, and inadequate analysis of the health effects of environmental problems,"<sup>3</sup> which has led to the recognition by the schools of public health that better comprehensive training of environmental health students and professionals is needed.

In its publication *Reducing Risk*, the U.S. Environmental Protection Agency's (EPA) Science Advisory Board (1990) observes "...professionals today need continuing education and training to help them understand the complex control technologies and pollution prevention strategies needed to reduce risk more effectively...Most environmental officials have been trained in a subset of environmental problems, such as air pollution, water pollution, or waste disposal. But they have not been trained to assist and respond to environmental problems in

an integrated and comprehensive way. Moreover, few have been taught to anticipate and prevent pollution from occurring or to utilize risk reduction tools beyond command-and-control regulations. This narrow focus is not very effective in the face of intermedia problems that have emerged over the past two decades and that are predicted for the future."<sup>4</sup>

The Health Resources and Services Administration (HRSA) Bureau of Health Professions recognizes a lack of contact and interaction between the providers of environmental health education and the employers of environmental employers. The Bureau of Health Professions sponsored a project to study Environmental Health Partnerships, which concluded that schools of public health should: "seek to expand environmental health education and training...to include a wider range of scientific, agency, professional, and accrediting bodies in new and innovative ways" and "encourage the involvement of private sector... (organizations)...in the academic process."<sup>5</sup>

## Academic Environmental Health Collaborations

With the need for better training of both students and professionals in mind, the University of Oklahoma School of Public Health and the Los Alamos National Laboratory (LANL) have exchanged students and staff for several years. These exchanges have involved LANL technical staff members serving as adjunct faculty members, and University of Oklahoma students serving internships and performing thesis

research at LANL. More recently, graduate students and faculty have collaborated with LANL staff members to solve 'real world' problems through academically organized, practice-based projects.

## Los Alamos National Laboratory

Los Alamos National Laboratory, located in Los Alamos, New Mexico, was established in 1943 and is funded by the Department of Energy as a part of the University of California system. It is a multi-disciplinary, multi-program scientific laboratory employing over 7,000 professionals engaged in both basic and applied research to solve specific technical and scientific problems. LANL's original mission—to design, develop, and test nuclear weapons—has broadened and evolved to accommodate changing technologies, U.S. priorities, and the new world community. Today, the mission of LANL ("Science Serving Society") is to reduce the global nuclear danger through science-based stockpile stewardship and support, nuclear materials management, nonproliferation and counterproliferation, environmental restoration and reversing the legacy of 50 years of production.

## Los Alamos's Role in Environmental Health

Given its mission statement of "Science Serving Society," LANL has responsibility and has accepted a leadership role for the protection of the environment, workers, and the public from hazards associated with its past and current activities.<sup>6</sup> While considerable profes-

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sional expertise exists at LANL among engineers, chemists, physicists, biologists, geologists, attorneys, managers, and planners, few of these professionals are actually trained in the basic public health sciences. Developing and maintaining a base of trained personnel is essential to providing effective and comprehensive program management of environmental and occupational health problems.

As an indication of its commitment to graduate education, including that in public health, LANL offers a Graduate Student Associate Program, which is a year-round educational program providing students with relevant research experience while they are pursuing a graduate degree. In some cases, students can arrange to conduct master's or doctoral thesis research at LANL. This program supports the science and technology base of LANL by fostering technical excellence through collaborative research with colleges and universities. LANL not only creates a qualified technical pool of diverse candidates for full-time employment, but offers unique and valuable experiences for students outside of the traditional academic setting.

## The University of Oklahoma College of Public Health

The Department of Occupational and Environmental Health, College of Public Health, at the University of Oklahoma Health Sciences Center has a unique program designed to offer students a dual track major in environmental health management and industrial hygiene. The focus of the program track is to prepare the M.P.H. and M.S. candidates as practitioners with a broader base of knowledge, skills and abilities than is typically available in programs with single track options. The department encourages a cross-cutting curriculum that incorporates

subject matter from basic public health sciences, and environmental management, industrial hygiene and safety.

## Educational Outreach Experience

*Integrated Environmental Management* is one course that was developed at the University of Oklahoma to introduce the students to the complete range of technical challenges encountered in the conduct of a project from beginning to end. For most students, the course serves as their first exposure to genuine project activities and the complex requirements associated with undertaking a field exercise. Initiated in 1991, the course is designed around a new project each year that is initially developed between the instructor and an external partner-organization. An opportunity to design and conduct a project at LANL each year has been offered annually since 1996. An early project performed by one class included the development of a tailored environmental health and safety audit system for the Transuranic Waste Inspectable Storage Project (TWISP). The following year, the next class had an opportunity to actually use the audit tool to conduct a site wide EHS management systems audit for the TWISP project.

The opportunity presented itself to design a regulatorily sound project for cleanup of Asbestos Containing Material (ACM) on Native American properties. This project was offered for the 1999 spring semester class. It was exactly the sort of complex cross-cutting project desired to meet the goals of the course.

## Northern New Mexico Pueblo System

Located throughout northern New Mexico, there are a total of eight Native American Pueblos. Pueblos and their governments existed in New Mexico more than five hundred years before

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the Spanish explorers and settlers.<sup>7</sup> Pueblo governments were officially recognized as sovereign nations by the Spanish Crown, and later by the governments of Mexico and the United States. Each Pueblo has a tribal government which crafts their own policy, laws, and rules and regulations. They also represent the official bodies through which they interact with federal, state, and local US governments. The Pueblos also administer a variety of public services such as law enforcement, cultural preservation, and environmental protection.

## San Ildefonso Pueblo

San Ildefonso Pueblo, "PO-WHO-GE-OWEENHE," means "where the water cuts through."<sup>8</sup> This is in reference to the Rio Grande river, which runs through the land of the Pueblo. The Pueblo people live on 26,000 acres of land located approximately 20 miles northwest of Santa Fe, New Mexico. The Pueblo lands extend from east of the Rio Grande west to Los Alamos.

A portion of the San Ildefonso land immediately adjacent to Laboratory property at a site known as Totavi was discovered by LANL employees to be contaminated with building materials containing asbestos. LANL had performed preliminary investigations about the extent of the contamination. Dr. Brandt, project leader at LANL and adjunct faculty at University of Oklahoma, suggested that the students in

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(Above): Los Alamos National Laboratory, Los Alamos, New Mexico  
(Left): Students and faculty from University of Oklahoma at Los Alamos National Laboratory



Integrated Environmental Management undertake the planning for the resolution of the asbestos issue as their project for the spring semester class in 1999.

## Project Design

Initially, the concept of working with experts at LANL and the stakeholders of the Pueblo to assess the potential health hazards associated with the asbestos contamination was presented to the students. Given the amount of work involved in such a project, it was considered imperative that the students understood the level of commitment required to successfully complete the complex project. The students recognized the need to first create a formal agreement between the two entities before the project could be performed. They understood that because LANL is a U.S. Government-supported facility operated under contract by the University of California, and that the San Ildefonso Pueblo is a sovereign nation, the students were essentially working with two separate governments.

In January, 1999, the class met for the first time and a notebook of material was distributed to the class that provided as much detailed background information as was available. A class project manager was named along with a co-director; materials were distributed and the class began to detail taskforce groups to begin developing subsets of the project activities. The role of the course instructors was only to oversee the activities of the students, assist with logistics and planning, and to provide guidance. The actual work on the project was done exclusively by the students.

LANL requested that the students develop the following project activities: (1) Site Specific Risk Assessment; (2) a Risk Communication Plan for the San Ildefonso leadership to communicate to the public about potential risks and site activities to the tribal members; (3) a flexible Site Specific Health and Safety Plan for contractors to follow in undertaking cleanup activities, and (4) technical options for remediating the contamination, including an estimate of the time and cost requirements for conducting site cleanup. In addition to the *Integrated Environmental Management* course, taught by Dr. Dan Boat-

right, a second class was approached to develop an element of the project. Students in the *Principles of Ergonomics and Safety*, taught by Dr. Margaret Phillips, accepted responsibility for developing the Site Specific Health and Safety Plan as a subcontractor to the *Integrated Environmental Management* class. In addition to industrial hygiene and dual track students, this class included healthcare professionals in occupational medicine and other degree tracks. Dr. Phillips became involved early in the evolution of the project, and solicited agreement from her class to participate.

The students realized that since they would be visiting LANL in late February to gather on site information, interview key individuals, and visit the site, it was vital to develop a strategy for moving the project from the conceptual phase to the performance phase. Through a series of steps, they defined information needs, the form in which the information they required was most likely to be available (documents, interviews, website, etc), established a list of individuals to interview while in Los Alamos, and arranged with Dr. Brandt for documents to be collected and for some to be forwarded to the University prior to their arrival so that preliminary review could be accomplished. Activities to be accomplished prior to visiting LANL were assigned to groups and individuals so that all of the time spent at the facility and in the area would be as productive as possible. All of the logistics and activities were managed by the students with oversight by the faculty.

## Student activities

On February 23, 1999, the site visit team consisting of 11 students and both Drs. Boatright and Phillips arrived in Los Alamos. Sixteen individual interviews were scheduled with nine different offices at LANL, as well as meetings

with the Environmental Coordinator of the San Ildefonso. At the end of each day, the students met to review and evaluate their progress and to refine their schedule for the following day. The student reports were given in a group process where student and faculty alike functioned as a part of the overall team. Opportunities were sought for each student to not only participate in as much of the process as possible, but to lead an interview activity and to report on their findings to the group.

The site visit team returned to their classes with a more developed understanding of stakeholder needs and interests. Background sampling data, compiled prior to the students' involvement and provided by LANL, served as the basis for discussions related to determining the friability of the asbestos. Since additional sampling and analysis was beyond the scope of the project for the students, decisions had to be made as to how cleanup planning would progress. Ultimately, based on the data provided, a decision was made to plan site remediation around alternatives that could be selected as additional information regarding friability became available. The alternatives ranged from an assumption that all ACM on site was friable to one where none of the ACM was friable. Based on the data provided, they selected as most probable, an alternative where a fraction of the material was friable and the remaining portion non-friable, with both categories to be handled in accordance with the applicable regulatory guidelines.

After the trip, the focus turned to structuring the project documents that would not only meet the regulatory requirements for the site remediation but also serve as a resource to the Pueblo. Although student involvement with the project was limited to the project over the course of the semester, there was a high level of interest in providing documents through which actual

decisions regarding the fate of materials at the Totavi site might be influenced.

## Summary Statement

The partnership established between the Department of Occupational and Environmental Health, University of Oklahoma Health Sciences Center and Los Alamos National Laboratory has proven to be an extremely productive relationship. The opportunity for graduate students in occupational and environmental health to experience significant real world professional responsibilities improves their ability to integrate classroom experience into application. Without exception, the students participating in the class since its inception have expressed a sense of value added through the process that they feel would be otherwise missing from their graduate education, and an appreciation for how occupational and environmental health are linked in the work environment. LANL benefits from such collaborations by enhancing the potential workforce and by integrating the public health approach into its basic science foundation.

As noted by Shalauta and colleagues, "A public health approach in epidemiology, health surveillance, and exposure surveillance can serve a valuable role in expanding the knowledge base on exposures and human health outcomes. Evaluation of actual human exposures and understanding the population health effects can guide prevention efforts and policy making. The need for this training is particularly acute for those charged with evaluating environmental risks and implementing risk management strategies aimed at protecting public health."<sup>9</sup>

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